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1. A computer-based method for adding a participant to a network of participants, each participant being connected to three or more other participants, the method comprising:

identifying pair of participants of the network that are connected;
disconnecting the participants of the identified pair from each other; and
connecting each participant of the identified pair of participants to the added participant.

2. The method of claim 1 wherein each participant is connected to 4 participants.

3. The method of claim 1 wherein the identifying of a pair includes randomly selecting a pair of participants that are connected.

4. The method of claim 3 wherein the randomly selecting of a pair includes sending a message through the network on a randomly selected path.

5. The method of claim 4 wherein when a participant receives the message, the participant sends the message to a randomly selected participant to which it is connected.

6. The method of claim 4 wherein the randomly selected path is approximately proportional to the diameter of the network.

7. The method of claim 1 wherein the participant to be added requests a portal computer to initiate the identifying of the pair of participants.

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1 8. The method of claim 7 wherein the initiating of the identifying of the
2 pair of participants includes the portal computer sending a message to a connected
3 participant requesting an edge connection.

1 9. The method of claim 8 wherein the portal computer indicates that the
2 message is to travel a certain distance and wherein the participant that receives the message
3 after the message has traveled that certain distance is one of the participants of the identified
4 pair of participants.

2 10. The method of claim 9 wherein the certain distance is approximately
twice the diameter of the network.

1 11. The method of claim 1 wherein the participants are connected via the
2 Internet.

1 12. The method of claim 1 wherein the participants are connected via
2 TCP/IP connections.

1 13. The method of claim 1 wherein the participants are computer processes.

1 14. A computer-based method for adding nodes to a graph that is m-regular
2 and m-connected to maintain the graph as m-regular, where m is four or greater, the method
3 comprising:

4 identifying p pairs of nodes of the graph that are connected, where p is
5 one half of m;

6 disconnecting the nodes of each identified pair from each other; and
7 connecting each node of the identified pairs of nodes to the added node.

1 15. The method of claim 14 wherein identifying of the p pairs of nodes
2 includes randomly selecting a pair of connected nodes.

1 16. The method of claim 14 wherein the nodes are computers and the
2 connections are point-to-point communications connections.

17. The method of claim 14 wherein m is even.

1 18. A method of initiating adding of a participant to a network, the method
2 comprising:
3 receiving a connection message from the participant to be added; and
4 sending a connection edge search message to a neighbor participant of
5 the participant that received the message wherein the connection edge search message is
6 forwarded to neighbor participants until a participant that receives the connection edge
7 search message decides to connect to the participant to be added.

1 19. The method of claim 18 wherein the sent connection edge search
2 message includes an indication of the number of participants to which the connection edge
3 search message should be forwarded.

1 20. The method of claim 19 wherein the number of participants is based on
2 the diameter of the network.

1 21. The method of claim 19 wherein the number of participants is
2 approximately twice the diameter.

1 22. The method of claim 18 wherein when a participant decides to connect
2 to the participant to be added, the neighbor participant that sent the connection edge search
3 message to the participant that decided to connect also decides to connect to the participant
4 to be added.

1 23. The method of claim 18 wherein participants that receive the connection
2 edge search message forward the connection edge search message to a randomly selected
3 neighbor.

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1 24. A method in a computer system for connecting to a new participant of a
2 network, the method comprising:

3 receiving at a participant a connection edge search message;
4 identifying a neighbor participant of the participant that received the
5 connection edge search message;
6 notifying the neighbor participant to connect to the new participant;
7 disconnecting the participant from the identified neighbor participant;
8 and
9 connecting the participant to the new participant.

1 25. The method of claim 24 including determining whether the participant is
2 the last participant in a path of participants through which the connection edge search
3 message was sent.

1 26. The method of claim 25 wherein when the participant is not the last
2 participant in the path, sending the connection edge search message to a neighbor of the
3 participant.

1 27. The method of claim 26 including randomly selecting the neighbor
2 participant to which the connection edge search message is to be sent.

1 28. The method of claim 24 wherein the received connection edge search
2 message includes an indication of the number of participants through which the connection
3 edge search message is to be sent.

1 29. The method of claim 24 including when the participant is already a
2 neighbor of the new participant, sending the connection edge search message to a neighbor
3 participant of the participant.

1 30. The method of claim 24 wherein the participants are computer
2 processes.

1 31. The method of claim 24 wherein the connections are point-to-point
2 connections.

3 32. A computer-readable medium containing instructions for controlling a
4 computer system to connect a participant to a network of participants, each participant being
5 connected to three or more other participants, the network representing a broadcast channel
6 wherein each participant forwards broadcast messages that it receives to its neighbor
7 participants, by a method comprising:

8 identifying a pair of participants of the network that are connected;
9 disconnecting the participants of the identified pair from each other; and
10 connecting each participant of the identified pair of participants to the
11 added participant.

1 33. The computer-readable medium of claim 32 wherein each participant is
2 connected to 4 participants.

1 34. The computer-readable medium of claim 32 wherein the identifying of a
2 pair includes randomly selecting a pair of participants that are connected.

1 35. The computer-readable medium of claim 34 wherein the randomly
2 selecting of a pair includes sending a message through the network on a randomly selected
3 path.

1 36. The computer-readable medium of claim 35 wherein when a participant
2 receives the message, the participant sends the message to a randomly selected participant to
3 which it is connected.

1 37. The computer-readable medium of claim 35 wherein the randomly
2 selected path is approximately twice a diameter of the network.

1 38. The computer-readable medium of claim 32 wherein the participant to
2 be added requests a portal computer to initiate the identifying of the pair of participants.

1 39. The computer-readable medium of claim 38 wherein the initiating of the
2 identifying of the pair of participants includes the portal computer sending a message to a
3 connected participant requesting an edge connection.

1 40. The computer-readable medium of claim 38 wherein the portal
2 computer indicates that the message is to travel a certain distance and wherein the participant
3 that receives the message after the message has traveled that certain distance is one of the
4 identified pair of participants.

1 41. A method in a computer system for connecting to a participant of a
2 network, the method comprising:

3 receiving at a participant a connection port search message sent by a
4 requesting participant; and

5 when the participant has a port that is available through which it can
6 connect to the requesting participant,

7 sending a port connection message to the requesting
8 participant proposing that the requesting participant connect to the available port of the
9 participant; and

10 when the participant receives a port proposal response
11 message that indicates the requesting participant accepts to connect to the available port,
12 connecting the participant to the requesting participant.

1 42. The method of claim 41 including:

2 when the participant does not have a port that is available through which
3 it can connect to the requesting participant, sending the connection port search message to a
4 neighbor participant.

43. The method of claim 41 wherein a port is available when the requesting participant is not already connected to the participant and the participant has an empty port.

44. A method in a computer system of detecting neighbors with empty ports condition in a network, the method comprising:

receiving at a first participant a connection port search message indicating that a second participant has an empty port; and

when the first participant is already connected to the second participant and the first participant has an empty port, sending a condition check message from the first participant to the second participant wherein the condition check message identifies neighbors of the first participant.

45. The method of claim 44 including:
when the second participant receives the condition check message,
when the second participant does not have the same
neighbors as the first participant, sending a condition repair message to third participant that
is a neighbor of the first participant but is not a neighbor of the second participant.

46. The method of claim 45 including:
when the third participant receives the condition repair message,
disconnecting from a neighbor of the third participant
other than the first participant; and
connecting to the second participant.

47. The method of claim 44 including:
when the second participant receives the condition check message,
when the second participant has the same neighbors as the
first participant, sending a condition double check message to a third participant that is a
neighbor of the second participant.

48. The method of claim 47 including:

2 when the third participant receives the condition double check message,
3 when the third participant does not have the same
4 neighbors as the first participant, sending a condition check message to a fourth participant
5 that is not the first participant or the second participant.

1 49. The method of claim 48 including:
2 when the fourth participant receives the condition check message,
3 sending a condition repair message to a fifth participant
4 directing the fifth participant to connect to the first participant or the second participant.

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